2010 Annual Survey of Public Employment and Payroll Methodology

The U.S. Census Bureau sponsors and conducts this annual survey of state and local governments as authorized by Title 13, United States Code, Section 182.

The survey measures the number of federal, state, and local civilian government employees and their gross payrolls for the pay period including March 12, 2010.

Population of Interest

The population of interest for this survey includes the civilian employees of all the Federal Government agencies (except the Central Intelligence Agency, the National Security Agency, and the Defense Intelligence Agency), all agencies of the 50 state governments, and 90,690 local governments (i.e., counties, municipalities, townships, special districts, and school districts) including the District of Columbia.

Content of the Survey

The survey provides state and local government data on full-time and part-time employment, part-time hours worked, full-time equivalent employment, and payroll statistics by governmental function (i.e., elementary and secondary education, higher education, police protection, fire protection, financial administration, central staff services, judicial and legal, highways, public welfare, solid waste management, sewerage, parks and recreation, health, hospitals, water supply, electric power, gas supply, transit, natural resources, correction, libraries, air transportation, water transport and terminals, other education, state liquor stores, social insurance administration, and housing and community development).

The survey provides Federal Government data on total employees, full-time employees, and total March payroll by governmental function. There is no detail available for part-time employment, part-time hours worked, full-time equivalent, or full-time or part-time employee payrolls. Three functions apply only to the Federal Government and have no counterpart at the state and local government levels: national defense and international relations, postal service, and space research and technology.

The questionnaires that were used to collect these data can be viewed at <GET FORMS> on the Government Employment and Payroll Website.

Critical definitions include the following:

Employment: Employment refers to all persons gainfully employed by and performing services for a government.

Employees: State and local government employees include all persons paid for personal services performed, including persons paid from federally funded

programs, paid elected or appointed officials, persons in a paid leave status, and persons paid on a per meeting, annual, semiannual, or quarterly basis. Unpaid officials, pensioners, persons whose work is performed on a fee basis, and contractors and their employees are excluded from the count of employees. For federal employees, employee counts are the on-board "head count" as of the end of the report period. The data collected for this survey include all federal civilian employees, including seasonal and intermittent employees, and employees on foreign assignments residing outside the 50 states and the District of Columbia. Employees of the Central Intelligence Agency, the National Security Agency, and the Defense Intelligence Agency are not included in any of the data presented by government function. Federal judges, members of Congress and their staffs, employees of the Congressional Budget Office, and elected (with the exception of the President) and appointed officials of the Executive Branch are included. Employees of non-appropriated funds of defense activities are not classified as federal employees; therefore, they are excluded.

Full-time employees: Full-time employees are defined to include those persons whose hours of work represent full-time employment in their employing government.

Part-time employees: Part-time employees are those persons who work less than the standard number of hours for full-time work in their employing government.

Full-time equivalent: Full-time equivalent (FTE) is a computed statistic representing the number of full-time employees that could have been employed if the reported number of hours worked by part-time employees had been worked by full-time employees. This statistic is calculated separately for each function of a government by dividing the "part-time hours paid" by the standard number of hours for full-time employees in the particular government and then adding the resulting quotient to the number of full-time employees.

Payroll: Payroll amounts represent gross payrolls for the 1-month period of March (31 days). The gross payroll includes all salaries, wages, fees, commissions, bonuses, or awards paid to employees during the pay period that includes the date of March 12. Payroll amounts reported for a period other than 1-month are converted to represent an amount for the month of March. All payroll figures are represented in current whole dollars and have not been adjusted for inflation.

Conversion of a reported payroll to a payroll amount that would have been paid during a 31-day month is accomplished by multiplying the reported payroll by an appropriate factor. For example, a 2-week payroll is multiplied by 2.214, a 1-week payroll is multiplied by 4.429, and a twice-a-month payroll is multiplied by 2.000.

Part-time hours: These data represent the number of hours worked by part-time employees during the pay period. Note: These data are not collected for publication but rather are used to calculate full-time equivalent employment data.

Data Collection

Confidentiality

The data that are collected in this survey are public record and are not confidential[1].

Dates of Collection

The following are important dates in the data collection process:

03/2010	Initial mail-out
04/2010	Reminder letter mail-out
06/2010	Follow-up mail-out
08/2011	Preliminary release to Census Bureau Internet
06/2013	Revised release to Census Bureau Internet

Methods

Data in these files are based on information obtained in the Annual Survey of Public Employment and Payroll. Census Bureau staff compiled Federal Government data from records of the U.S. Office of Personnel Management. Forty-five of the state governments provided data from central payroll records for all or most of their agencies/institutions. Data for agencies and institutions for the remaining state governments were obtained by mail canvass questionnaires. Local governments were also canvassed using a mail questionnaire. However, elementary and secondary school system data in Florida, North Dakota, and Washington were supplied by special arrangements with the state education agency in each of these states. Additionally, in Delaware, a state government respondent supplied data for school districts. Eight counties, six cities and another local school district provided data in an electronic format. All respondents receiving the mail questionnaire had the option of completing the survey using a web-based survey instrument developed for reporting the data. The online survey instrument was completed by 18.7% of the state-level responding units and 49.6% of the local government respondents.

Sample Design

The 2009 sample for the Annual Survey of Public Employment and Payroll was selected from the 2007 Census of Governments: Employment Component (CoG-E) and updated with births to the universe since 2007. A two-stage sample was designed to produce state-by-type of government estimates with a relative standard error of three percent or less on FTE employees and total payroll. In the first stage, the sample design is a stratified probability proportional to size (PPS) design. In the second stage, a modified cut-off sample method was developed to

[1] Title 13, United States Code, Section 9.

reduce the number of small townships and special districts. There are a total of 90,690 units on the frame.

Units satisfying the following criteria were automatically included in the sample with a probability of 1.0000. These certainty units represent themselves only.

- All county governments with a 2007 population of 100,000 or more.
- All municipalities with a 2007 population of 75,000 or more.
- All townships with a 2007 population of 50,000 or more.
- All independent school districts with an enrollment of 10,000 or more.
- All school districts providing college level (postsecondary) education.
- All special districts that meet at least one of the following criteria:
    - FTE of 1,000 or more,
    - All water utilities (function code 91) in the state of Connecticut,
    - All electric utilities (function code 92) in the states of Maine, New Hampshire, Rhode Island, Utah, and Wisconsin,
    - All gas utilities (function code 93).

All other units were given a chance of selection based on the total payroll of the unit. Prior to selecting the sample, the sampling frame was sorted by state and type of government (city, county, township, special district, school district). For special districts, the sampling frame was sorted by probability of selection within function code. (Note: See Chapter 12 of the <2006 Classification Manual> for the categories for classifying Employment data.)

Prior to the 2010 mail-out, the sample universe file was updated with births (units that did not exist previously) since 2009. All city, county, township, and school district births were added to the sample with a probability of selection of 1.0000. Special districts were included with certainty if they met the certainty criteria as mentioned above. The remaining special districts were sorted by function code and state, and then sampled systematically at a rate of 1 in 25.

Weighting

The weight for each unit in the sample is the reciprocal of that unit's probability of being selected into the sample. The weight was obtained by the modified cutoff Probability Proportion to Size (PPS) sampling method. The value of Total Payroll was used for a unit's measure of size.

Sample size

A final sample of 10,312 units was selected. Of the total number of governments in the sample, approximately 0.5 percent are states, 14.1 percent are counties, 35.2 percent are cities and townships, 29.9 percent are special districts, and 20.3 percent are school districts. All 50 state governments, all Hawaii local units, and the District of Columbia are certainty units with a weight of 1.0000.

Data Processing

Editing

Editing is a process that tries to ensure the accuracy, completeness, and consistency of survey data. Efforts are made at all phases of collection, processing, and tabulation to minimize reporting, keying, and processing errors.

Although some edits are built into the Internet data collection instrument and the data entry programs, the majority of the edits are performed post collection. Edits consist primarily of two types: (1) *consistency edit* and (2) an *historical ratio edit* of the current year's reported value to the prior year's value.

The *consistency edits* check the logical relationships of data items reported on the form. For example, if a value exists for employees for a function then a value must exist for payroll also. If part-time employees and payroll are reported then part-time hours must be reported and vice versa.

For each function reported for the employees, the *historical ratio edits* compare data for the number of employees and the average salary between reporting years. If data fall outside of acceptable tolerance levels, the item is flagged for review. Additional checks are made comparing data from the Annual Finance Survey to data reported on the Survey of Public Employment and Payroll to verify that if employees are reported on the Survey of Public Employment and Payroll at a particular function the government also reported a corresponding expenditure on the Annual Finance Survey.

For *historical ratio edits* and *consistency edits*, the edit results are reviewed by analysts and adjusted as needed. When the analyst is unable to resolve or accept the edit failure, contact is made with the respondent to verify or correct the reported data.

Imputation

Not all respondents answer every item on the questionnaire. There are also questionnaires that are not returned despite efforts to gain a response. Imputation is the process of filling in missing or invalid data with reasonable values in order to have a complete data set for estimating state and national totals.

For nonresponding general purpose governments, dependent and independent school districts, and for special district governments, the imputations were based on recent historical data from either a prior year annual survey or the 2007 Census of Governments: Employment Component, if available. These data were adjusted by a growth rate that was determined by the growth of responding units that were similar (in size, geography, and type of government) to the nonrespondent. If there were no recent historical data available, the imputations were based on the data from a randomly selected responding donor that was similar (based on the same criteria) to the nonrespondent. For general purpose governments, and for dependent and independent school districts, the selected donor's data were adjusted by dividing each data item by the population (or

enrollment) of the donor and multiplying the result by the nonrespondent's population (or enrollment).

Because of the merging of dependent and independent schools in Maine, this state had to be imputed by itself. We also had to use a crosswalk so that the proper prior year data would be used for imputing the nonrespondents.

Estimation

Estimation is the process by which sample data are used to project the value of an unknown quantity in a population. In the publications for employment statistics, total full-time employment, total full-time payroll, total full-time equivalent, total part-time employment, total part-time payroll, total part-time hours, and their coefficients of variation are published. Estimates of these major totals are made using a model-assisted approach called Decision based Estimation. Papers on this methodology are included in the "For Further Information" section. A composite estimate for each state by function code variable can be obtained from the sample data and known 2007 Census estimates.

To obtain separate estimates for each state by function "cell" (e.g. Corrections for Minnesota), we use small area estimation. There are two straightforward methods to make the estimates, and better results are obtained overall by combining the two methods. The Horvitz-Thompson or HT estimator is a weighted sum of the sample data. Intuitively, each unit in the sample represents itself and possibly many other units. To get the HT estimator, multiply each data point in the sample by the number of units it represents, and then sum the units. The synthetic estimator assumes that employment in 2010 is proportional to employment in 2007 for the same state and item.

These two methods have different tradeoffs. The HT estimator has no bias (the expected value equals the true value), but it can be sensitive to units with high weights. The synthetic estimator can be biased, but often has lower variance than the HT. We can do better by taking an estimate somewhere between the two, called a composite estimate. Usually, it is about halfway between.

Sampling Variability

The data that are provided come from a sample rather than a census of all possible units. The particular sample that was selected is one of a large number of possible samples of the same size and sample design that could have been selected. Each sample would have yielded different estimates. The estimated coefficients of variation, which are provided for each estimate, are an estimate of this sampling variability. In this tabulation the coefficients of variation are expressed as percentages. The coefficient of variation (CV) is the ratio of the standard error to the expectation of the estimate. We used a Taylor series method to estimate the standard error.

State government employment and payroll data are not subject to sampling error. Consequently, state and local government aggregates for individual states are more reliable statistically than the local government only estimates.

Data Quality

Nonsampling Errors

Although every effort (as described in the Data Processing section) is made in all phases of collection, processing, and tabulation to minimize errors, the sample data are subject to nonsampling errors (such as, inability to obtain data for every variable from all units in the sample, inaccuracies in classification, response errors, misinterpretation of questions, mistakes in keying and coding, and coverage errors). These same errors may be evident in census collections and may affect the Census of Governments data used to adjust the sample during the estimation phase and used in the imputation process.

Modal Distribution

Each respondent that received a mail questionnaire had the option of returning the paper questionnaire, reporting data using a website developed for reporting data electronically, or working directly with staff members to report over the phone, fax or email. In addition, some governments have developed alternative reporting arrangements, known as central collection. The following table shows the response rate by mode for state and local governments that reported to the Annual Survey of Public Employment and Payroll.

	State Governments	Local Governments
Web	18.7%	49.6%
Paper	17.0%	41.2%
Central Collection	59.4%	1.1%
Other	4.9%	8.1%

Overall Unit Response Rate

The overall unit response rate to the 2010 Annual Survey of Public Employment and Payroll was 92.0 percent. All of the 50 state governments responded to the survey. In determining the unit response rate, a unit was determined to be a respondent if it provided information on all of the key variables for at least one function on the survey form. This unit response rate was calculated for each state as well as for the total U.S., and gives the percentage of the units in the eligible universe that actually responded to the survey.

For 2010, weighted item response rates are published for each item. This rate is calculated by dividing the weighted value of the item as reported by respondents by the weighted value of the item reported for respondents and imputations for nonrespondents.

Total Quantity Response Rate

The Total Quantity Response Rate was also calculated for the key variables for each state. This response rate is computed separately for each key variable by summing the data provided by the respondents for the key variable and dividing this sum by the sum of the respondent data and the imputed data for the key variable. The result is multiplied by 100. Total Quantity Response Rates for total employment and total payroll for each state are available in the response rate files.

The Census Bureau's quality standard on releasing data products requires a 70 percent Total Quantity Response Rate (TQRR) for key items. Although the unit response rates are well above the 60 percent Census Bureau's quality standard, Maryland, Massachusetts, Nebraska, Oklahoma, Oregon, Rhode Island and Vermont state and local estimates fail to meet the 70 percent TQRR standard for at least one key item. Most of the states are noncompliant on Part-time (PT) Payroll and/or PT Employment. There are four states (Connecticut, Maine, Massachusetts, and New Jersey) that are noncompliant for at least one TQRR key item for the local estimates. Additionally, there are ten states (Maryland, Missouri, Nebraska, New Mexico, Ohio, Oklahoma, Oregon, Rhode Island, Utah, and Vermont) that are noncompliant for at least one TQRR key item for the state estimates. Most of these states are noncompliant on Part-time (PT) Payroll and/or PT Employment, but Nebraska and Oregon are noncompliant on all key state variables. Files of the unit response rates and TQRRs for all states are available in the Response Rate Tables section.

Response Rate Tables

State & Local Response Rates [TXT, 6KB] – Unit and Total Quantity response rates by state for state and local governments combined

Local Response Rates [TXT, 6KB] – Unit and Total Quantity response rates by state for local governments

For Further Information:

Barth, Joseph J., Yang Cheng, and Carma Hogue. "Reducing the Public Employment Survey Sample Size," Joint Statistical Meetings, 2009

Cheng, Yang, Casey Corcoran, Joe Barth and Carma Hogue. "An Estimation Procedure for the New Employment Survey Design," Joint Statistical Meetings, 2009

Cheng, Yang, Eric Slud, and Carma Hogue. "Variance Estimation for Decision-Based Estimators with Application to the Annual Survey of Public Employment and Payroll," Joint Statistical Meetings, 2010